REMARKS

Claims 1-8, 10-13, 15-21, 23-24, and 26-34 are pending in the Application, of which claims 1, 11, 12, 17, 19, 20, 23, and 24 are in independent form. Claims 9, 14, 21-22, and 25-26 are canceled. Claims 1, 5, 7, 11-13, 17-20, 23, 24, and 28-34 are amended herein.

Applicants believe that no new matter has been added through the amendments and additions to the claims.

All pending claims stand rejected in the Office Action mailed July 23, 2008 (the "Office Action"). In light of the amendments and remarks herein, reconsideration of the pending claims is respectfully requested. For the Examiner's convenience, this response addresses each of the issues in the order it was raised in the Office Action.

I. Examiner Interview

Applicants wish to express sincere appreciation for the telephone interview granted by Examiner Nguyen on October 16, 2008. During the interview, it was generally agreed that the claim amendments set forth herein are sufficient to overcome the pending claim rejections, as discussed in greater detail below.

II. Rejection of Claims 1-20, 23, 24, and 27 under 35 U.S.C. § 103

The Office Action rejects claims 1-20, 23, 24, and 27 under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Pat. No. 4,582,985 to Lofberg ("Lofberg") in view of U.S. Patent No. 5,456,256 to Schneider et al. ("Schneider").

To support a *prima facie* case of obviousness, the Office Action must offer a "clear articulation of the reason(s) why the claimed invention would have been obvious." KSR Intl. Co. v. Teleflex Inc., 127 S. Ct. 1727 (2007)*; also see* MPEP § 2143. The analysis supporting the rejection should be made explicit. *See* MPEP § 2143. Any rejection under § 103 must consider all the words in the claim. *See* In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)*; also see* MPEP § 2143.03. Therefore, the cited prior art must teach or suggest all the claim limitations. *See* In Re Royka 490 F.2d 981 (CCPA 1974).

Since even in combination Lofberg and Schneider fail to teach or suggest at least, "an energy emitter configured to emit an electromagnetic energy signal … configured to penetrate said user to measure and internal, sub-dermal physiological characteristic of said user" and/or

"a biometric marker ..., wherein said biometric marker comprises a continuous, time-variant biometric marker" as recited in claims 1-20, 23, 24, and 27, Applicants respectfully traverse the rejection of these claims.

A. Neither Lofberg nor Schneider Teach or Suggest an Electromagnetic Energy Signal Configured to Measure an Internal, Sub-Dermal Physiological Characteristic of a User

Claim 1 as amended herein recites:

> "…an energy emitter configured to emit an electromagnetic energy signal toward said user, wherein said electromagnetic energy signal is configured to penetrate said user to measure an internal, sub-dermal physiological characteristic of said user…" Emphasis added.

Claims 12, 17, 19, 20, and 24 recite similar features.

Schneider does not teach or suggest an electromagnetic energy signal as recited in the claims. Schneider discusses the use of an "ultrasonic beam" to image various human features. Schneider col. 5 lines 19-23. As is well known in the art, ultrasonic energy is acoustic energy having a frequency greater than the upper limit of human hearing (greater than 20 kHz). *See* Richard C. Dorf, "The Electrical Engineering Handbook," Second Edition, CRC Press (hereafter "Handbook") at 2622. Ultrasonic energy is pressure based and, as such, requires a medium for propagation:

> "The acoustic wave phenomenon causes displacement of particles… which results in pressure and density changes within [a] medium. For a traveling sinusoidal wave, the variation in acoustic pressure (the difference between the total and ambient pressure), excess density, particle displacement, particle velocity, and particle acceleration can be represented by the form
>
> $$p = Pe^{-\alpha x}\cos(\omega t - kx)$$
>
> for a wave propagating in the positive x direction, where p is the pressure …, P is the amplitude, w is the angular frequency, and $w = 2\pi f$ where f is the frequency in hertz, k is the propagation constant and $k=w/c$ where c is the propagation speed, α is the attenuation coefficient, and t is the time." Id.

Ultrasound may be used to image soft body tissues, but the ultrasonic energy often travels through fluids (*e.g.,* traveling through amniotic fluid when imaging a fetus). Generally, bone and lung structures cannot be imaged with ultrasound. Id at 2623.

Attenuation of ultrasonic energy increases roughly linearly with frequency. Generally, the selection of a particular ultrasonic frequency for use in a particular application is a trade-off between spatial resolution and imaging depth, wherein lower frequencies may produce lower resolution images, but be capable of penetrating deeper into the body. Id. Schneider discusses using ultrasonic energy at approximately 30 MHz, "to capture images from structures just below the surface of the finger…" Schneider col. 11 lines 49-50. The frequencies commonly used in medical imaging fall within the range of 2 to 10 MHz, which represents a compromise between increased penetration and resolution. *See* Handbook at 2623. Accordingly, the 30 MHz discussed in Schneider would be unlikely to be capable of penetrating a user's finger without a significant reduction in frequency with a corresponding reduction in resolution.

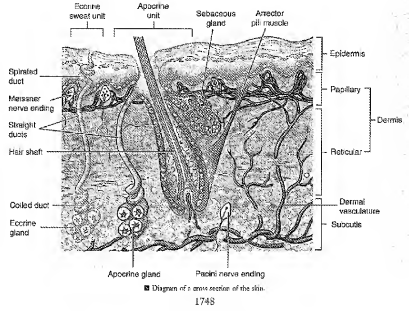
In direct contrast, claim 1 recites an **energy emitter** configured to emit an **electromagnetic energy signal**. The pressure-based, ultrasonic energy discussed in Schneider **cannot** be construed as teaching or suggesting an **electromagnetic energy emitter** and/or **electromagnetic energy signal** as recited in the claims. As is well known in the art, electromagnetic energy comprises a self-propagating wave consisting of an electric field component and a magnetic field component, each of which oscillate in phase perpendicularly to one another in the direction of energy propagation. *See* Maxwell's Equations; *also see* Handbook at 889-897. As such, unlike ultrasonic energy, no medium is required for propagation of an electromagnetic energy signal (*e.g.,* electromagnetic energy may propagate in the absence of a medium). Accordingly, the generation means, transmission means, and/or sensing means of these types of energy are different and **completely incompatible**.

The Office Action purports that Lofberg teaches the recited electromagnetic energy. *See* Office Action 4 ¶ 3. However, the claims do not simply recite an "electromagnetic energy emitter," rather claim 1 recites an electromagnetic signal that is "**configured to penetrate said user to measure an internal, sub-dermal physiological characteristic of said user**." The light discussed in Lofberg **does not** penetrate a user to measure an internal, sub-dermal physiological characteristic of a user. Thus, although Lofberg may discuss light, it does not teach or suggest an electromagnetic signal as recited in the claims.

As discussed above, the claims recite an "energy emitter to emit an **electromagnetic energy signal** … configured to penetrate said user **to measure an internal, sub-dermal**

physiological characteristic of said user." Claim 1; emphasis added. Neither Schneider nor Lofberg teach or suggest the recited energy emitter and/or recited electromagnetic energy signal. Although Schneider may mention sub-dermal imaging, the signal used to perform such imaging is exclusively **ultrasonic**. *See* Schneider. As discussed above, ultrasonic energy cannot be construed as electromagnetic energy. Accordingly, Schneider cannot not teach or suggest the recited energy emitter and/or the recited electromagnetic energy signal. Furthermore, although Lofberg may discussed light energy, the light energy purportedly discussed in Lofberg **is not configured to penetrate a user to measure an internal, sub-dermal physiological characteristic of said user** as recited in the claims. *See* claim 1.

As noted in Applicants' previous response, the fingerprint reader purportedly discussed in Lofberg **cannot** be construed as measuring an internal, sub-dermal physiological characteristic of a user. Regarding the term "sub-dermal," the term "dermal" is defined as "pertaining to the dermis." Dorland's Illustrated Medical Dictionary 500 (31st Edition, 2007). The dermis is defined as " the layer of the skin deep to the epidermis, consisting of a dense bed of vascular connective issue; it is divided into a papillary layer (TA, stratum papillare) and a reticular layer (TA, stratum reticulare)…" Id. at 506. Dorland's Illustrated Medical Dictionary provides a diagram of the skin showing the dermal layer. This diagram is replicated below:



Dorland's Illustrated Medical Dictionary Pg. 1748 (cross section of the skin)

Note that in the cross section of the skin, the dermis (dermal layer) is shown as below the epidermis. As such, the dermis cannot include any epidermal features, such as fingerprints or the like since an internal, sub-dermal physiological characteristic excludes any epidermal characteristics (*e.g.,* fingerprints).

For example, a fingerprint is defined as, "[a]n impression of the inked bulb of the distal phalanx of a finger, showing the configuration of the surface ridges, used as means of identification…" Stedman's Medical Dictionary 731 (28th Edition, 2008); emphasis added. Since a fingerprint corresponds to surface ridges on the skin, specifically the epidermis, a sub-dermal characteristic would inherently exclude a fingerprint; this is because the dermis is below the epidermis layer of the skin. *See* Illustration above. As such, a sub-dermal characteristic necessarily excludes fingerprints or other, external skin features.

With respect to internal, sub-dermal physiological characteristics, the specification teaches the use of such characteristics in biometric authentication. For example, the disclosure states:

> "The biometric sensor is configured to determine specific unique internal biometric markers of a user. In a preferred embodiment of the invention, the sensor includes an emitter and a receiver. The emitter emits light or another form of energy which is partially absorbed and partially reflected by a portion of flesh of a user. Such light or energy may include, but is not limited to, ultrasonic energy, infra red light, near infra red light, ultra violet light, specific wavelength-visible or nonvisible light, white light, or electrical signals. The receiver collects those portions of light or energy that are reflected from the user. Based upon the light or energy reflected, data relating to internal biometric markers may be determined and a biometric profile of the user may be constructed. Some of the internal biometric markers which may be measured or determined from the biometric sensor include, but are not limited to, bone density, electromagnetic waves, cardiac rhythms, diacrotic notch readings, blood oxygen levels, capillary density, glucose levels, hematocrit levels, or sub-dermal layer analysis…." Pg. 9 line 18 – Pg. 10 line 2; emphasis added.

Each of the characteristics listed above (bone density, cardiac rhythms, etc.) are characteristics occurring below the dermal layer of skin.

In addition, the disclosure teaches that the biometric sensor may be configured to penetrate a user's epidermis (*e.g.,* enter the sub-dermal layer), "[a] preferred embodiment of the invention utilizes an infra red LED, which emits sufficient infra red light to penetrate the epidermal layer of skin of a user." Pg. 13 lines 4-5; emphasis added.

Therefore, even in combination, Lofberg and Schneider cannot support a *prima facie* case of obviousness since they fail to consider all the words of claims 1-20, 23, 24, and 27. In particular, the purported combination of Lofberg and Schneider fails to teach or suggest at least, "an energy emitter configured to emit an **electromagnetic energy signal**…configured to penetrate said user to measure an **internal, sub-dermal physiological characteristic** of said user." *See* claim 1; emphasis added.

Moreover, Lofberg cannot be combined with Schneider: "[i]f [a] proposed modification or combination of the prior art would **change the principle of operation** of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." In Re Ratti 270 F.2d 810 (CCPA 1959); *also see* MPEP § 2143.02(VI); emphasis added. As discussed above, the pressure-based, ultrasonic energy discussed in Schneider is radically different from, and incompatible with the light emitting diodes purportedly discussed in Lofberg. Modifying Lofberg to emit and/or detect a completely different type of energy (ultrasonic energy as opposed to light energy) clearly represents a change of a **principle of operation** of Lofberg. Accordingly, the combination is **not sufficient** to render the claims *prima facie* obvious. *See* In Re Ratti; *also see* MPEP § 2143.02(VI).

B. Neither Lofberg nor Schneider Teach or Suggest Measuring a Continuous, Time-Variant Biometric Marker Comprising a Plurality of Measurements of an Internal, Sub-Dermal Physiological Characteristic Obtained Over Time

Claim 11 as amended herein recites:

"…a biometric sensor configured to measure a **continuous, time variant internal, sub-dermal physiological process occurring within a user** from which a **continuous, time-variant, internal, sub-dermal** biometric marker of said user may be determined…" Emphasis added.

Claim 23 recites:

"…**obtaining a plurality of measurements of a continuous, time-variant internal, sub-dermal physiological processes occurring within a user**…

…determining an internal, sub-dermal biometric marker of said user using said measurements of said **continuous, time-variant, internal, sub-dermal physiological processes occurring within said user** …" Emphasis added.

The disclosure teaches measuring a number of different continuous, time-variant processes occurring within a user, such as **cardiac rhythms** and **diacrotic notch readings** (*e.g.,* on a blood pressure waveform). *See* Pg. 9 line 26 – Pg. 10 line 5. These continuous, time-variant processes may be measured over time, resulting in a plurality of continuously time-variant measurements. For example, as is well known in the art, a blood pressure waveform may be obtained by measuring a plurality of blood pressure readings over time and/or under various resistance conditions. As taught in the disclosure, the combination of the plurality of continuous, time-variant measurements may result in a biometric marker, such as a cardiac rhythm and/or diacritic notch reading corresponding to an internal process occurring within the user. *See* Pg. 9 line 26 – Pg. 10 line 5.

In contrast, both Lofberg and Schneider discuss biometric information corresponding to static fingerprint images. Lofberg purports to discuss, "a verification device … comprising a sensor device for **sensing a finger tip of the owner** and obtaining the corresponding finger print line information… [and] comparator means for comparing [an] identification bit sequence and said reference bit sequence..." Lofberg col. 3 lines 42-61. Similarly, Schneider discusses an "ultrasonic imaging system." Schneider Abstract; emphasis added. In Schneider, users are authenticated if an image match is found between a captured image (of the user) and a stored image, "[the] identification system takes the image obtained from the scanned finger and compares it to a large database of previously scanned images to determine if a match exists." Schneider col. 23 lines 43-46. The other biometric measurements purportedly discussed in Schneider (*e.g.,* internal structure, such as blood vessel patterns) are all based on static image comparisons. *See* Schneider col. 3 lines 50-65.

The static, image-based characteristics discussed in Lofberg and Schneider do not change with time and, as such, **cannot be construed as continuous and/or time variant**. Both Lofberg and Schneider discuss comparing static imagery data (of fingerprints or other structures) or "sequences" of image line data to perform user verification. Under both Lofberg and Schneider, an image obtained at a first time must necessarily correspond to an image obtained at a second time; otherwise, verification of user identity based on the imagery data would be impossible. Therefore, the image-based verification purportedly discussed in Lofberg and Schneider cannot be construed as measuring a "**continuous, time variant internal, sub-dermal physiological processes occurring within a user**" as recited in the

claims. *See* claims 11 and 23. Moreover, since both Lofberg and Schneider discuss static image-based biometrics, neither may be construed as measuring a **process occurring within a user** as recited in the claims. *See* claims 11 and 23.

Therefore, even in combination, Lofberg and Schneider cannot support a *prima facie* case of obviousness since they fail to consider all the words of claims 1-20, 23, 24, and 27. In particular, the purported combination of Lofberg and Schneider fails to teach or suggest at least, "a biometric sensor configured to measure a continuous, time-variant internal, sub-dermal physiological process of a user" and/or a "continuous, time-variant internal, sub-dermal biometric marker …" *See* claims 11 and claim 23; emphasis added.

III. Rejection of Claims 28-34 under 35 U.S.C. § 103

A. Rejection of Claims 28-31

Claims 28-34 recite features relating to using a plurality of biometric markers and/or selecting between a plurality of different types of biometric markers, wherein each biometric marker corresponds to a "different type of internal, sub-dermal physiological characteristics" of a user. *See* Claim 28. Claim 29 recites a device "configured to select one of [a] plurality of different types of internal, sub-dermal physiological characteristics of [a] user…" *See* Claim 29. Claim 30 recites a device configured to "prevent identification of [a] selected one of said plurality of different types of … characteristics…" Claim 31 recites obtaining a plurality of different biometric measurements.

Neither Lofberg nor Schneider teach or suggest a device capable of obtaining a plurality of different types of biometric markers, much less a device capable of selecting between a plurality of different types of biometric markers and/or preventing identification of a selection of one of a plurality of biometric measurements as recited in the claims.

The Office Action purports that Schneider teaches these features since it discusses possible alternatives to fingerprint based biometrics, specifically, "sub-dermal layer analysis." Schneider col. 4 lines 12-49; *also see* Office Action Pg. 5 ¶ 4.

However, the mere discussion of other possible biometric markers is **not** what is claimed. Rather, claims 28 recites a biometric sensor, "configured to measure a plurality of **different types of internal, sub-dermal physiological characteristics** of said user." Emphasis added. Claim 29 recites "[a] device … configured to **select one of said plurality of**

different types of internal, sub-dermal physiological characteristics of said user…" Emphasis added. Schneider does not teach or suggest a device configured to measure a plurality of different internal, sub-dermal physiological characteristics of a user, much less a device **configured to select** one of a plurality of characteristics. In fact, Schneider states that in order for the device discussed therein to read "internal" characteristics, the operating frequency of the system may be changed: "[i]n order to image this deep within the finger [as opposed to the finger tip for fingerprint imaging], a lower frequency transducer must be used." Schneider col. 5 lines 1-2. Accordingly, the ultrasonic device discussed in Schneider cannot selectively image different portions of a user and, as such, cannot be construed as teaching or suggesting a device configured to measure a plurality of different internal, sub-dermal physiological characteristics of a user and/or selecting one of a plurality of characteristics of a user as recited in the claims.

In addition, claim 29 recites preventing identification of a selected characteristic the device is to measure; clearly, Schneider cannot be construed as teaching or suggesting preventing identification of a selection it does not make.

B. Rejection of Claims 32-34

Claims 32 and 33 recite, "selecting a first one of said plurality of different types of internal, sub-dermal physiological characteristics." As discussed above, neither Lofberg nor Schneider teach or suggest selecting one of a plurality of different physiological characteristics.

Claim 34 recites:

"..wherein the device is further configured to…

emit first electromagnetic energy signal from said electromagnetic energy emitter to measure said first one of said plurality of different types of internal, sub-dermal physiological characteristics of said user,

receive a returned first electromagnetic energy signal from said user responsive to said first emitted electromagnetic energy signal comprising a measurement of said first one of said plurality of different types of internal, sub-dermal physiological characteristics of said user;

determine a first internal, sub-dermal biometric marker of said user using said returned first electromagnetic energy signal,

emit a second electromagnetic energy signal from said energy emitter to measure said second one of said plurality of different types of internal, sub-dermal physiological characteristics of said user,

receive a returned second electromagnetic energy signal from said user responsive to said second emitted electromagnetic energy signal comprising a measurement of said second one of said plurality of different types of internal, sub-dermal physiological characteristics of said user,

determine a second internal, sub-dermal biometric marker of said user using said returned second energy signal,

compare the first biometric marker and said second biometric marker to said biometric profile of said authorized user of the device, and

generate an authentication signal if said first biometric marker and said second biometric marker match said biometric profile of said authorized user of said device." Emphasis added.

The Office Action purports that Schneider teaches the recited features in its discussion of "a plurality of specular reflection[s] due to a plurality of platen surfaces…" *See* Office Action Pg. 6 ¶ 1. However, the "specular reflections" discussed in Schneider are **not** measurements as recited in the claims. Moreover, the reflections are not used to determine respective **biometric markers** as recited in the claims. In fact, Schneider explicitly states that the reflections are to be **canceled out**, and not included in the resulting fingertip image or used to verify a user. Schneider states that the "multiple signals" produced by the "dual platen" comprise echoes from the front and back sides of the platen, which are **range gated out** of the data. Schneider col.11 lines 63-66. Schneider further states that if it becomes impossible to "gate out" the echoes, the ultrasonic transducer "must be **oriented in such a way as to eliminate [the] echoes**." Schneider col. 11 line 66 – col. 12 line 2; emphasis added. Since Schneider states that the reflections are removed ("gated" or otherwise eliminated via orientation of the transducer), the echoes cited by the Office Action **cannot** be construed as a plurality of biometric markers as recited in the claims.

IV. General Considerations

By the remarks provided herein, Applicants have addressed all outstanding issues presented in the Office Action. Applicants note that the remarks presented herein have been made merely to clarify the claimed invention from elements purported by the Office Action to be taught by the cited references. Such remarks should not be construed as acquiescence, on the part of Applicants, as to the purported teachings or prior art status of the cited references, nor as to the characterization of the cited references advanced in the Office Action.

Accordingly, Applicants reserve the right to challenge the purported teachings and prior art status of the cited references at an appropriate time.

CONCLUSION

For the reasons discussed above, Applicants submit that the claims are in proper condition for allowance, and a Notice of Allowance is respectfully requested. If the Examiner notes any further matters that may be resolved by a telephone interview, the Examiner is encouraged to contact John Thompson by telephone at (801) 578-6994.

DATED this 30th day of October, 2008.

Respectfully submitted,

By /John R. Thompson/
John R. Thompson
Registration No. 40,842

STOEL RIVES LLP
One Utah Center Suite 1100
201 S Main Street
Salt Lake City, UT 84111-4904
Telephone: (801) 328-3131
Facsimile: (801) 578-6999